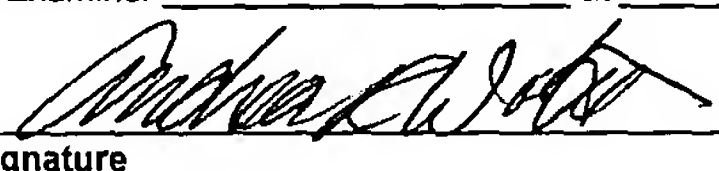




PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: ALAN JAMES MAPLE AND IAN MARTIN LENNARD
For: DOOR LOCKING MECHANISM
Serial No.: 10/604,575 Examiner:
Filed: July 31, 2003 Group Art Unit:
Docket No.: 70933-144

CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))	
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TRANSMITTAL OF PRIORITY DOCUMENT

Applicants submit herewith a certified copy of the priority document (United Kingdom Application No. 0217984.4) relied upon by Applicants in the captioned application, pursuant to 37 C.F.R. § 1.55(a)(2).

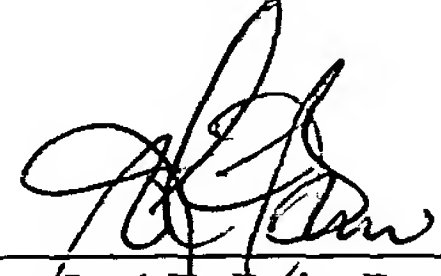
Please direct any questions relating to this matter to the undersigned attorney for Applicants.

Respectfully submitted,

Alan James Maple and Ian Martin Lennard

Date: 27 August 2003

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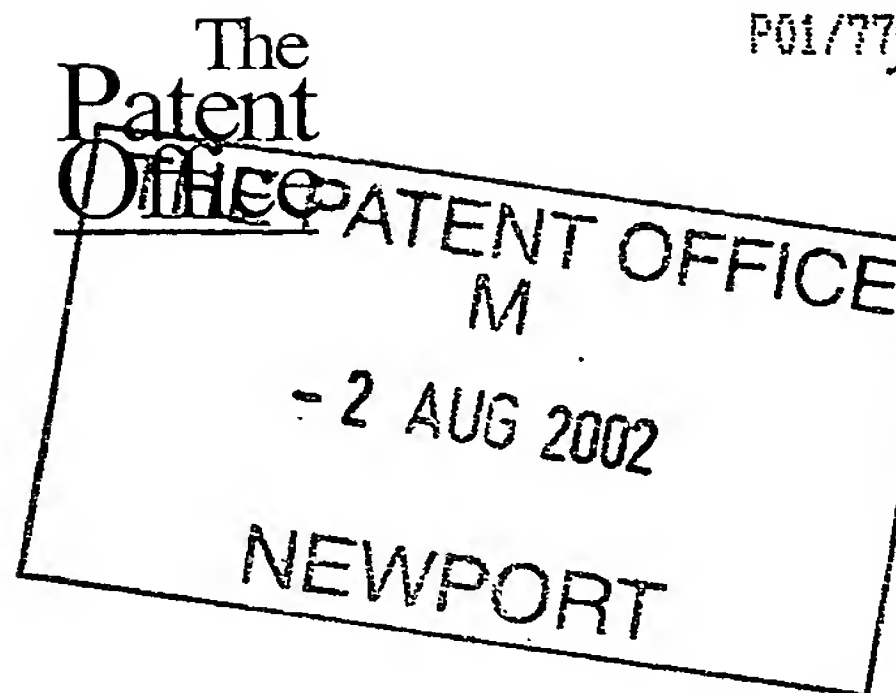
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1. Your reference

6/LC/12812

2. Patent application number

(The Patent Office will fill in this part)

0217984.4

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

J. Maple & Son Limited
Maple House
Crown Royal Industrial Park
Shawcross Street
Stockport
Cheshire SK1 3EY

Patents ADP number (*if you know it*)

8438442001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

DOOR LOCKING MECHANISM

5. Name of your agent (*if you have one*)

Sanderson & Co.

"Address for service" in the United Kingdom to which all correspondence should be sent (*including postcode*)

34 East Stockwell Street
Colchester
Essex
CO1 1st

Patents ADP number (*if you know it*)

1446001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
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Date of filing
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Number of earlier application

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

Yes

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Any other documents (Please specify)

11. I/We request the grant of a patent on the basis of this application.

Sanderson & Co.
Agents for the applicant

Signature

Date
1st August 2002

12. Name and daytime telephone number of person to contact in the United Kingdom F.C. Gillam – 01206 571187

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DOOR LOCKING MECHANISM

This invention relates to a hinged-door locking mechanism and in particular – but not exclusively – to a locking mechanism suitable for use on a commercial vehicle or cargo container having at least one access door hinged
5 about a vertical edge to a frame within which the door fits.

Many box-body commercial vehicles and cargo containers are provided with a pair of so-called barn doors at the rear end, which doors are hinged to vertical side frame members of the vehicle body or container, such that the doors may be hinged outwardly to lie back against the side of the body or
10 container, to give free access to the interior of the body or container. Usually, one door must be closed first and then closing of the second door holds the one door closed, such that a suitable closure and locking mechanism for the second door is sufficient to maintain both doors closed and locked.

Various locking mechanisms have been designed for box-body
15 commercial vehicles and cargo containers having barn doors. For enhanced security, it is advantageous to provide mechanisms which lock to both upper and lower frame members around the opening for the doors. If both such mechanisms are key-operated or otherwise power-operated, either a complex mechanism must be provided within the structure of the door, or suitable
20 mechanisms are required both above and below the second door, to permit locking to be performed. In the case of the former, power cables or conduits must be arranged for communication with the inside face of the door but these are prone to wear or other deterioration as the doors are opened and closed. In the case of the latter, there can be problems ensuring synchronised

operation of both mechanisms especially if the opening exposed by the doors is not to be obstructed.

A principal aim of the present invention is to provide a mechanism suitable for use for example on a commercial vehicle body and which is of simple construction and yet permits a door to be held closed and locked at two
5 spaced locations (typically, along upper and lower frame members) without requiring power feeds of any kind to be supplied to the inside face of the door.

According to the present invention there is provided a hinged-door locking mechanism, comprising:

10 – a first actuator adapted for mounting on a frame for the door and including a first bolt movable between free and locked settings, which first bolt when in its locked setting secures the door to the frame to resist opening movement thereof;

– a second actuator adapted for mounting on the door at a location
15 spaced from the first actuator and including a second bolt movable between free and locked settings, which bolt when in its locked setting also secures the door to the frame to resist opening movement thereof; and

– drive means adapted for mounting on the door and interconnecting the second actuator with the first bolt when in its locked setting, whereby when
20 in use on a hinged door, operation of the first actuator to move the first bolt to its locked setting causes the operation of the second actuator to move the second bolt to its locked setting.

It will be appreciated that with the arrangement of this invention, an actuator may be provided on a fixed frame member at one location around the
25 periphery of the door and which serves to secure the door in its closed position.

The drive means transfers the mechanical locking action at that location to a second spaced location such that a further actuator may also secure the door in its closed position at that second location. Typically, the door may in this way be locked along its top and bottom edges, remote from the hinged edge of the door and preferably close to the other vertical edge of the door. Provided that the door configuration is such that one door must be closed before the door which is associated with the locking mechanism then the one door will also be held securely closed when the other door is closed and locked.

The invention extends to a locking mechanism of this invention as described above in combination with a door hingedly mounted for opening movement within a frame, the first actuator being mounted on the frame for co-operation with a receptor for the first bolt mounted on the door and the second actuator also being mounted on the door for co-operation with a keep provided on the frame.

Preferably, the drive means includes a plunger mounted for sliding movement within a receptor (or keep) for the first bolt, which receptor is attached to or forms a part of the door. In such a case, the second actuator may comprise a housing also mounted on the door and with the second bolt slidably carried in that housing.

The drive means may include a cable interconnecting the plunger and the second bolt. Such a cable may comprise an outer sheath within which a flexible compression-resistant inner shaft may slide, whereby movement of the plunger can be transferred to the second bolt. Alternatively, the cable could comprise a flexible tensile member suitably arranged to pull the second bolt upon movement of the plunger. A further alternative would be to provide a

pneumatic link between the plunger and the second bolt, such a link including for instance a flexible tube transferring pressure generated by the plunger to the second bolt to effect movement thereof.

In an alternative arrangement, the drive means could be electrically-operated, the plunger serving to operate a switch to permit the supply of electricity to the second actuator, to cause the operation thereof. However, such an arrangement would require an electricity feed to the door and this would have the disadvantage of increasing the complexity and the possibility of a supply failure, on account of the flexing of the electricity feed upon opening and closing of the door.

By way of example only, one specific embodiment of this invention will now be described in detail, reference being made to the accompanying drawings in which:-

Figure 1 diagrammatically illustrates a commercial vehicle having barn doors of the kind to which this invention may be applied;

Figure 2 is a diagrammatic view of the door frame for a pair of barn doors, one of which is provided with the embodiment of locking mechanism;

Figures 2A and 2B are detailed views on an enlarged scale of the components shown in the marked areas on Figure 2; and

Figure 3 illustrates a compression-resistant flexible cable also shown in Figure 2.

Referring initially to Figure 1, there is shown diagrammatically a commercial vehicle 10 having a box body 11 provided with a pair of so-called barn doors 12 and 13 at the rear end of the body. Each leaf is hinged to a vertical side edge of the vehicle body and the doors are arranged so that one

leaf must be closed first, whereafter closing and securing in the closed position the other leaf holds the one leaf closed.

Figure 2 shows the door arrangement of the vehicle of Figure 1. At the rear of the body, there is a rectangular frame made up of a pair of vertical members 15 and 16 and upper and lower horizontal members 17 and 18. For a
5 typical vehicle body those members will be of steel box sections, welded together. The doors 12 and 13 are entirely conventional and are hinged to the vertical members 15 and 16, the arrangement being such that door 12 must be closed first and then the closing of door 13 holds door 12 closed.

10 The upper horizontal member 17 supports a linear actuator 20 having a bolt 21, the line of movement of the bolt being parallel to the horizontal member 17. A receptor (or keep) 22 is secured to the inside face of door 13 immediately adjacent the actuator 20 such that when bolt 21 is withdrawn into the actuator, the door may be closed but subsequent operation of the actuator
15 drives the bolt forwardly out of the housing towards vertical member 15, so that the bolt is received in the receptor and thus restrains opening movement of the door. The actuator may be electrically, pneumatically or hydraulically operated, using fixed power lines secured within the vehicle body.

A second linear actuator 24 is provided on the inside face of door 13,
20 above the lower horizontal member 19 and adjacent the free edge of the door. This actuator includes a bolt 25 which may be received in a suitable opening (or keep) provided in the lower horizontal member, and when so received, also secures the door against opening. A spring (not shown) is provided within the actuator, to maintain the bolt in its withdrawn position, unless driven forwardly
25 against the action of the spring. The actuator 24 is carried on a mounting plate

26 which is itself secured to the door, the plate additionally serving to protect the actuator from accidental damage.

A flexible cable 28 interconnects the receptor 22 associated with the actuator 20 and the bolt 25 of the second actuator 24. This cable comprises an
5 outer sheath 29 within which is slidably mounted a flexible inner shaft 30 adapted to withstand compressive forces. One end of the outer sheath 29 is secured to the receptor 22 and the other end to the second actuator 24. One end of the inner shaft 30 is provided with a plunger 31 which is, when the cable is secured to the receptor 22, directly opposed to and coaxial with the bolt 21,
10 whereas the other end of the shaft is provided with a piston 32, directly opposed to and coaxial with bolt 25. The cable 28 is held to the receptor 22 by a locking plate 33, and to the second actuator 24 by a further locking plate 34.

In use, once the doors 12,13 have been closed, a remote control (typically fitted in the driver's cab) is operated to cause bolt 21 associated with
15 the linear actuator 20 to be projected out of the actuator into receptor 22. This locks the upper edge of the door to the upper member, and also drives plunger 30 into the outer sheath. In turn, through the shaft 30, this drives piston 32 and so causes bolt 25 to be projected into the aperture in the lower horizontal frame member 18. In this way, the door is held securely locked, until the remote
20 control is once more operated to release the locking mechanism.

CLAIMS

1. A hinged-door locking mechanism, comprising:
 - a first actuator adapted for mounting on a frame for the door and including a first bolt movable between free and locked settings, which first bolt
5 when in its locked setting secures the door to the frame to resist opening movement thereof;
 - a second actuator adapted for mounting on the door at a location spaced from the first actuator and including a second bolt movable between free and locked settings, which bolt when in its locked setting also secures the
10 door to the frame to resist opening movement thereof; and
 - drive means adapted for mounting on the door and interconnecting the second actuator with the first bolt when in its locked setting, whereby when in use on a hinged door, operation of the first actuator to move the first bolt to its locked setting causes the operation of the second actuator to move the
15 second bolt to its locked setting.
2. A hinged-door locking mechanism as claimed in claim 1, wherein the drive means includes a plunger mounted for sliding movement within a receptor for the first bolt, which receptor is adapted for mounting on a door.
3. A hinged-door locking mechanism as claimed in claim 2, wherein the
20 second actuator comprises a housing adapted for mounting on the door, the second bolt being slidably mounted in the housing.
4. A hinged-door locking mechanism as claimed in claim 2, wherein a spring is provided to urge the second bolt towards its free setting, the second bolt being moveable towards its locked setting against the action of the spring.

5. A hinged-door locking mechanism as claimed in claim any of claims 2 to 4, wherein the drive means includes a cable interconnecting the plunger and the second bolt.

6. A hinged-door locking mechanism as claimed in claim 5, wherein said
5 cable comprises an outer sheath within which is slidably mounted a flexible compression-resistant inner shaft, to transfer movement of the plunger to the second bolt.

7. A hinged-door locking mechanism as claimed in claim 6, wherein the plunger is directly provided on one end of the inner shaft.

10 8. A hinged-door locking mechanism as claimed in any one of claims 2 to 4, wherein the drive means includes a pneumatic or hydraulic link, interconnecting the plunger and the second bolt.

9. A hinged-door locking mechanism as claimed in any of the preceding claims, wherein the first actuator is one of pneumatically, hydraulically or
15 electrically operated.

10. A hinged-door locking mechanism as claimed in claim 1 and substantially as hereinbefore described, with reference to and as illustrated in the accompanying drawings.

11. A hinged-door locking mechanism as claimed in any of the preceding
20 claims in combination with a door hingedly mounted for opening movement within a frame, the first actuator being mounted on the frame for co-operation with a receptor for the first bolt mounted on the door, and the second actuator being mounted on the door for co-operation with a keep provided on the frame

12. A combination as claimed in claim 11, wherein the first actuator is
25 mounted on a frame member extending at right angles to the frame member to

which the door is hinged, and the second actuator is mounted on an edge of the door for co-operation with a frame member opposed to that supporting the first actuator.

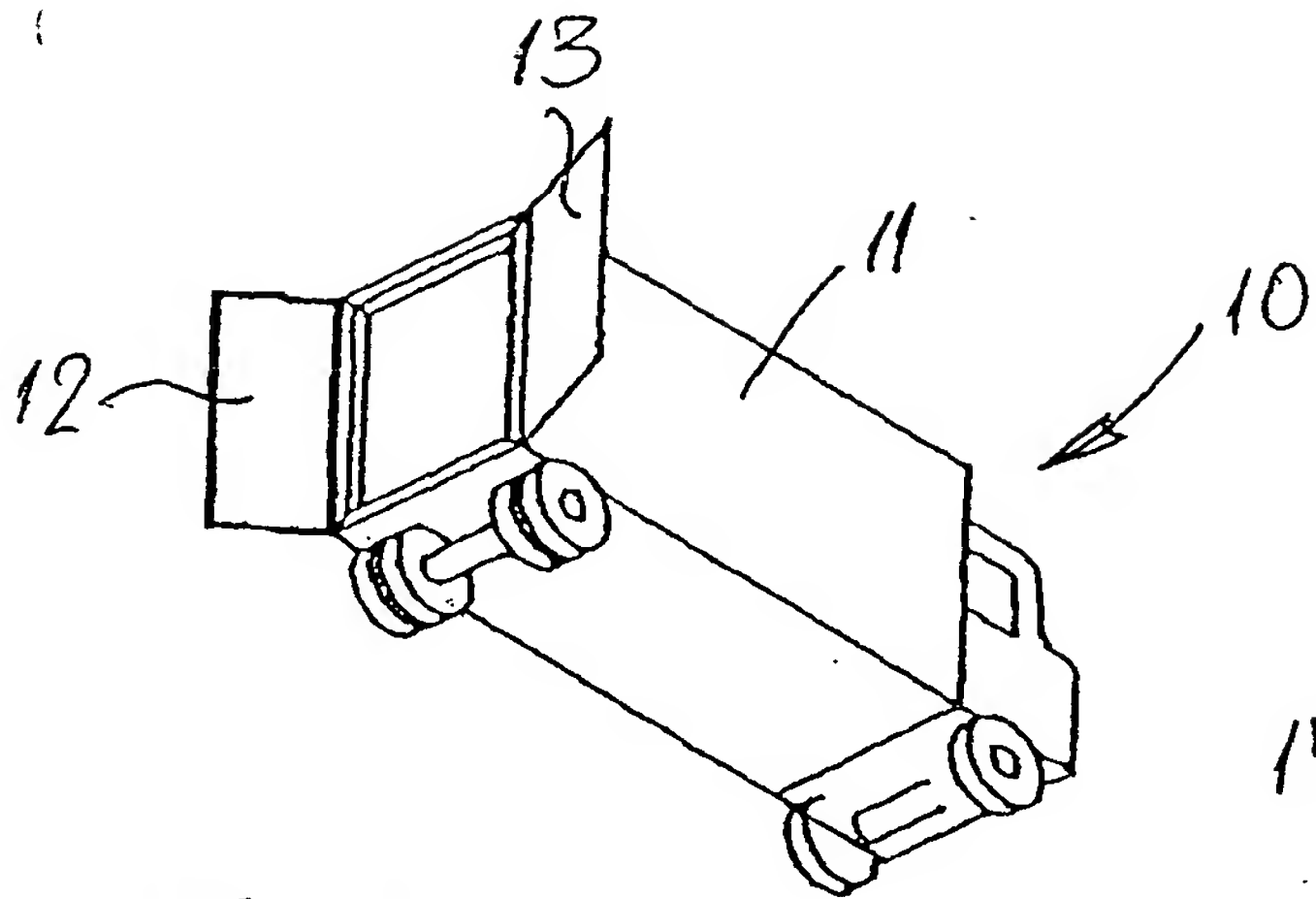


Fig 1

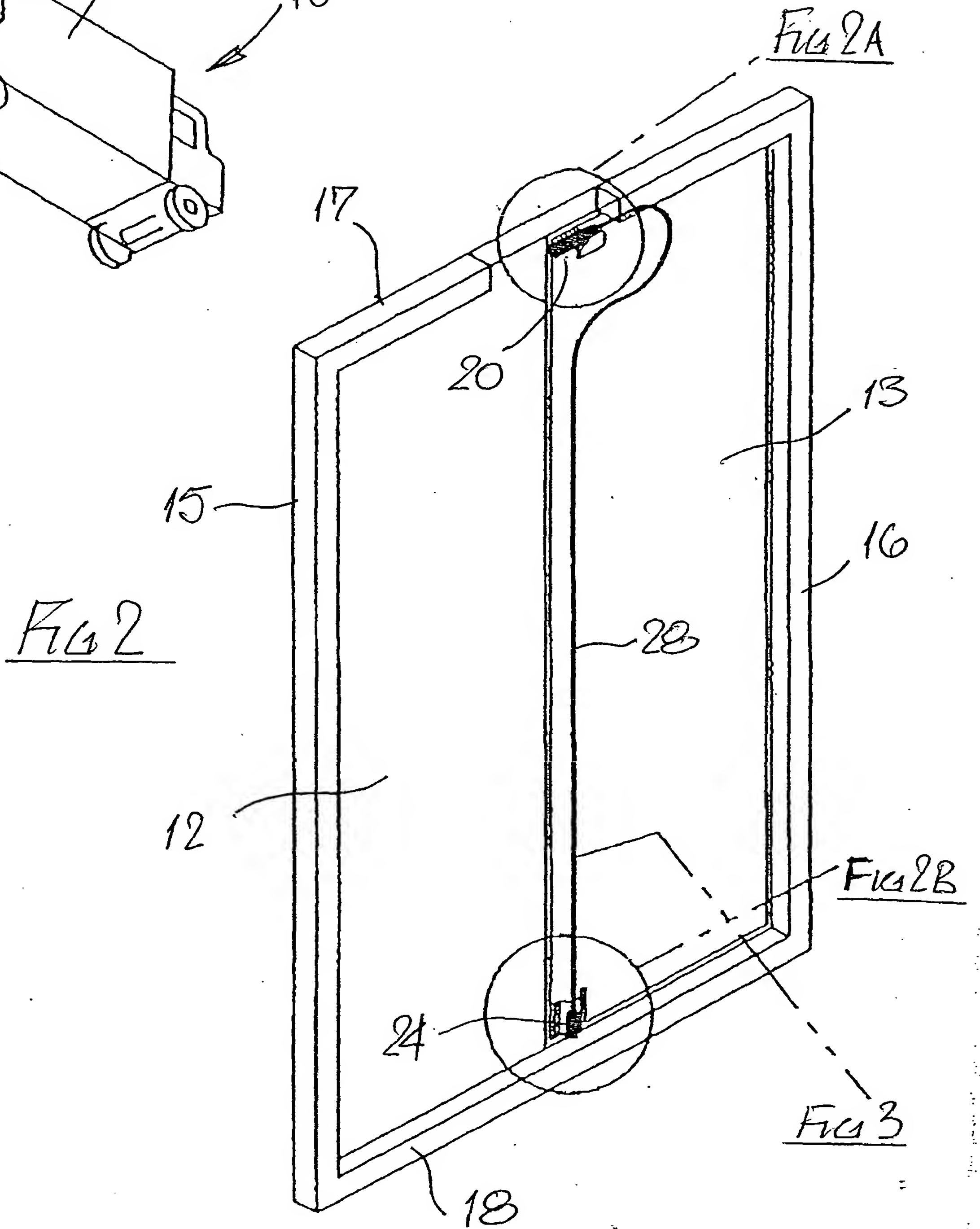


Fig 2

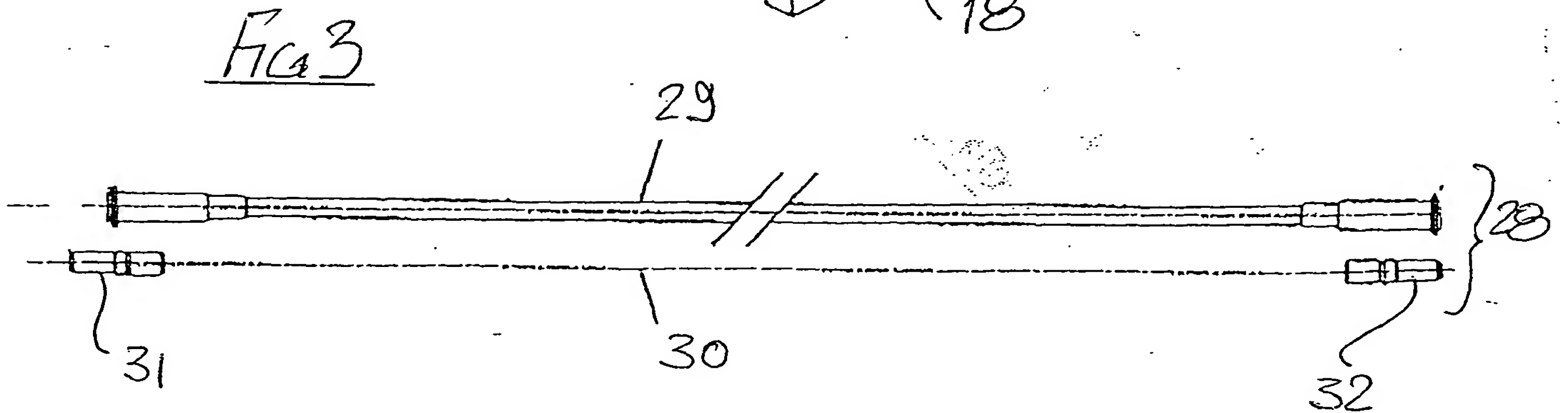


Fig 3

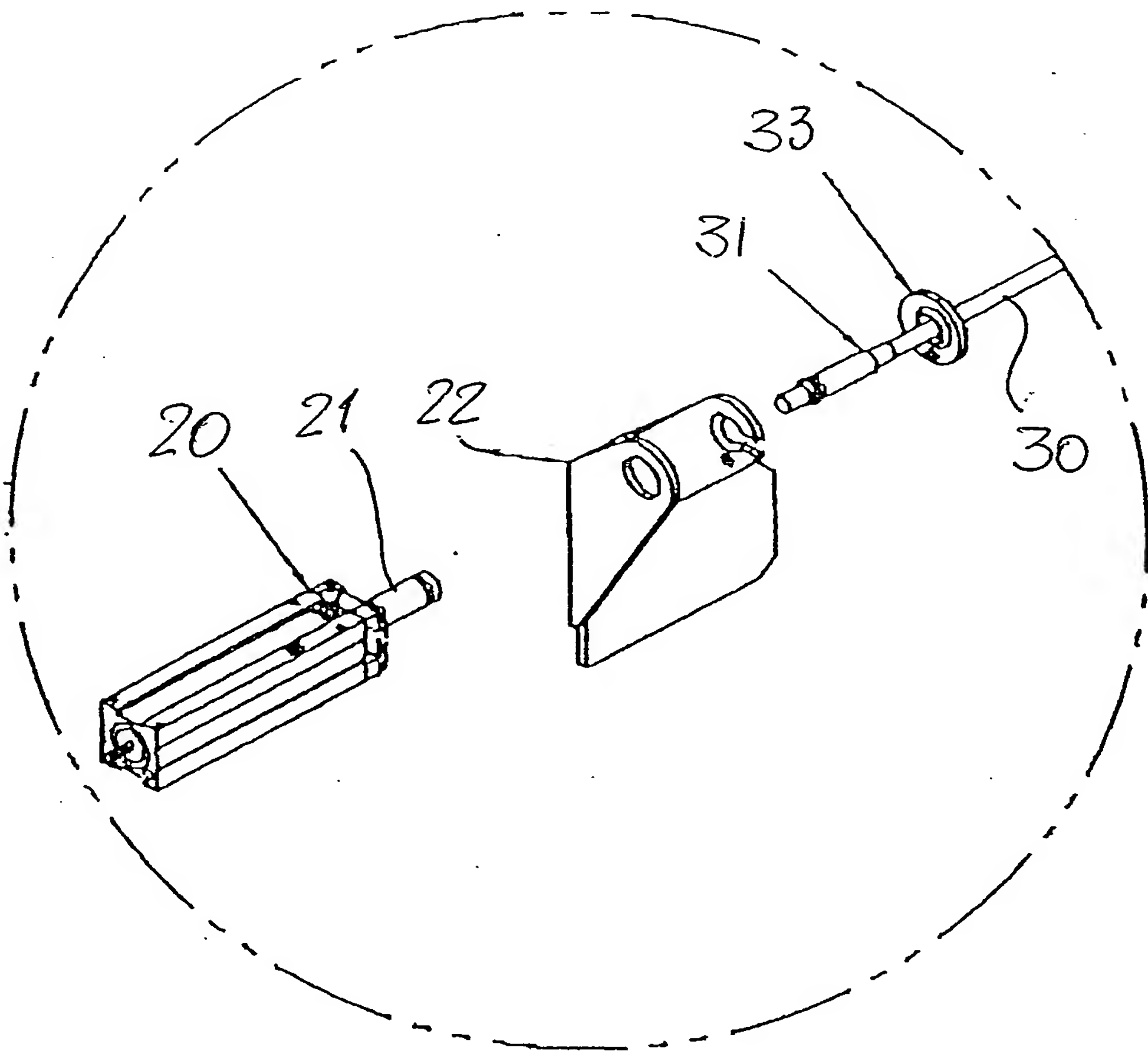


FIG 2A

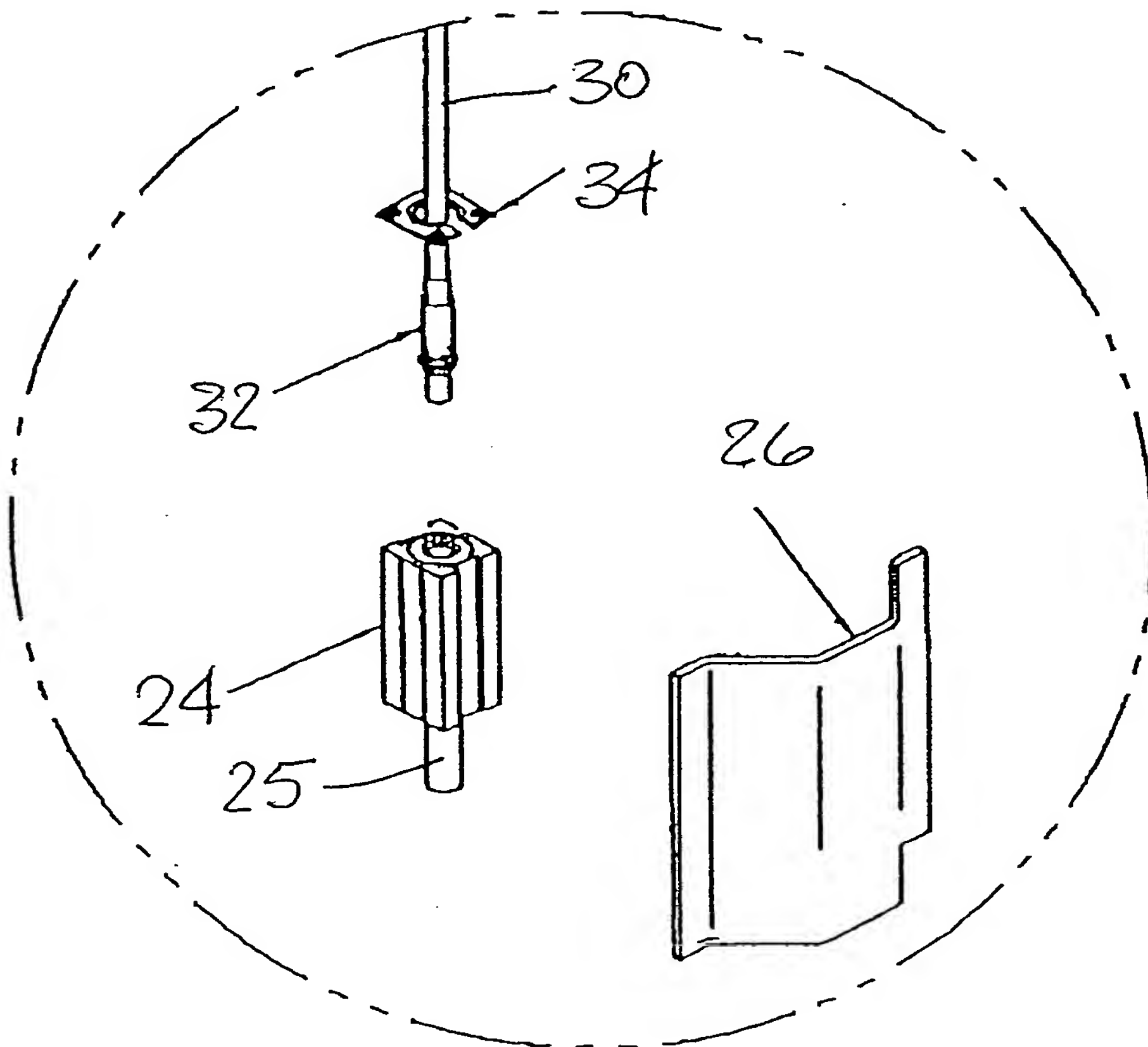


FIG 2B

